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BOOK REVIEW

Derek Byerlee, Walter P. Falcon and Rosamond L. Naylor: The Tropical Oil Crop Revolution: Food, Feed, Fuel and Forests.

Oxford University Press, Oxford, UK; 2017, viii + 288 pp. ISBN 9780190222987; also available as an ebook.

Ann Bruce

Oilseeds are among the most rapidly expanding of all agricultural crops, and a recent report on global diets¹ by CIAT (Centre for Research on Tropical Agriculture) confirms that they have become globally dominant contributors to calorific intake. Moreover, oil crops are also critical for feeding livestock and for the production of biofuels. This book, therefore, covers a most important topic for those interested in food security in its widest sense, and it does so from an interdisciplinary perspective.

What comes to your mind, I wonder, when you think about tropical oil crops? The images that came to my northern hemisphere mind were of oil palm and such issues as tropical forest destruction, the extinction of Orangutans and loss of land rights of indigenous populations. While not avoiding such important matters, the book sets out a much more nuanced picture and ends on a modestly optimistic note. It focuses on two main crops, oil palm and soybeans, and examines them in a tropical context.

¹ <http://ciat.cgiar.org/the-changing-global-diet/> accessed 27th April 2017

The authors are distinguished specialists whose expertise embraces agribusiness, land use change and deforestation, land governance, food policy, and economics of global food systems. As might be expected from such perspectives, the chapters taken together provide a holistic view of tropical oil crop production, rather than simply focusing on biological and agricultural aspects. Importance is given to issues in developing oil crop production, such as the role of policy (especially in controlling access to land and land titles) and infrastructure (in particular, the way in which roads and ports are making land accessible to cultivation and international trade). Reading this book I imagined squeezing a palm fruit so that oil oozed out. In a similar way I imagine now that if I squeeze the book itself, statistics will ooze out, for it is extremely rich in such detail, on a myriad different subjects, and is thus an invaluable information resource.

As a newcomer to tropical oil crop studies, I found a wealth of information that gave me new perspectives on the subject, helping me to understand why the sector has developed as it has. As an example, the requirement for fresh palm fruits to be processed within 24 hours of harvesting, leading to advantages for processing close to where they are grown, and the statistics that suggest that a profitable palm oil mill will need 10,000 hectares of oil palm to supply it, gave me a picture of the vast areas needed for oil palm plantations.

A number of fascinating case studies from South America, Africa and SE Asia illustrate the complexity of tropical oil crop production, and the importance of taking into account the special circumstances of an individual country, rather than assuming that the production of a single crop is the same wherever it is cultivated. A whole chapter dedicated to palm oil includes case studies from Malaysia, Indonesia, West

Africa (Cameroon and Ghana) and Colombia, each with its particular history and context. A chapter on soybean provides case studies from Brazil, India and southern Africa.

I learned, in reading the book, that oil palm started as an African crop, produced purely by small-holders, and the key role that a one company, Lever Brothers (now Unilever), has played in its development. I learned that in Malaysia, palm oil plantations were introduced as an alternative to the declining rubber plantations and that replacing one plantation with another meant that there was little concern about novel social and environmental impacts. Indeed the authors argue that oil palm production has contributed considerably to poverty reduction in Malaysia. In contrast the introduction of oil palm to Indonesia has been more controversial. There oil palm cropping is much more closely associated with deforestation and conflict over land ownership and use. The deforestation has increased greenhouse gas emissions both due to the loss of the forests themselves and also to the release of carbon when oil palm is planted on peat land. Many readers will also remember the pictures of large forest fires in Indonesia in 1997 that affected air quality in the whole area, and in particular in Malaysia and Singapore.

Similarly, the specific circumstances underlying increases in soybean production are described for Brazil's Cerrado, Central India and southern Africa. The authors suggest that expansion of soybean production in Brazil was led by large-scale family farms and agribusiness, whereas expansion of production in India was dominated by poor smallholders.

Soybeans, originating in China, are used extensively for human consumption in Asia. However, the authors identify complex markets for soybean products because soybean meal

and oil are produced together. Nearly 90% of soybean meal is processed into protein feed (mostly for livestock), and oil accounts for only about 1/3 of the total value of the crop. This means that when meat consumption increases in China, demand for soybean meal increases and this, in turn, reduces prices for vegetable oil for food and biofuel in the global markets. Similarly, when the EU demands more biofuel, the supply of soybean meal on global markets increases, giving lower feed prices to livestock producers.

A theme throughout this book is predicting how the various oil crop sectors will develop in the future. In terms of oil palm, the authors see Africa as a potential growth area, but with the possibility that small-scale farmers will be increasingly replaced by large-scale operators, such as SIAT, Socfin and SIFCA, together with the increasing presence of Asian companies such as Sime Darby, Golden Agri-Resources and the Siva group.

Tropical oilseeds products have become, almost by stealth, part of the daily lives of people throughout the world. At the beginning of each academic year, for example, I walk the aisles of my local supermarket looking for products containing oil palm and then invite my students to reflect on these and identify the common ingredient. Although awareness of the use of oil palm has grown, most of them, like most people in Europe, are still surprised at the extent to which palm (and soybean) oils are ingredients in the food products routinely on sale. These constitute, of course, just one local manifestation of the enormous increase in global trade, which is identified as a major driver of the increase in tropical oil crop production. Consumers around the world are linked to producers in tropical countries, often thanks to more and more countries joining the World Trade Organization. The result is

that production is concentrated in a very small number of countries which then dominate trade in individual crops. Thus the USA, Brazil and Argentina account for 82% of global output of soybean products, while Indonesia and Malaysia produce around 85% of oil palm products. From such global interlinkages, the authors identify a number of relationships that I found fascinating, such as China investing in infrastructure in Latin America to link Brazil to Pacific ports, thereby facilitating oil crop exports.

Vegetable oil for consumption increased from a global 35Mt in 1980 to 165 Mt in 2013, which the authors point out is an increase of more than twice the rate of population increase during the same period. Why has this increase taken place? It is argued that the reasons are complex, but include health concerns associated with the consumption of animal fats, increasing demand for animal feed (largely derived from soybean) and government policies to promote renewable fuels, leading to increased demands for biodiesel. In our interlinked world, changes in one aspect of living on one continent can have profound impacts on an entirely different one.

Many students I speak to hold very negative views of the impact of oil crops. This book provides a good antidote to such attitudes by listing some of the many benefits that tropical oil crops have brought with them. These include jobs, economic growth and sometimes benefits to small holder farmers, oil palm in Thailand and soybean in India being good examples of the latter. The book does not flinch, however, from also identifying the negative impacts of tropical oil crops, such as loss of land to local communities, abuse of labourers, small holder farmers losing out to large agribusinesses, the health risks associated with the

consumption of too much palm oil, and the risk to supply resulting from excessive reliance on production in only a few countries. The environmental impacts of land use changes, including increased greenhouse gas emissions, biodiversity loss and problems in the management of water resources, are identified as matters of particular concern.

On the positive side, however, the authors note that deforestation declined sharply in the Brazilian Amazon region after 2004. No single factor is identified as the cause, but rather a complex set of factors including: the Brazilian government's targeting reductions in greenhouse gas emissions; civil society campaigns against soybean cultivated in recently deforested land, with the largest soybean processors and exporters supporting a moratorium on the purchase of soybean from land deforested after 2006; new capacity to monitor forest clearance using real-time satellite monitoring; payments for environmental services (particularly under REDD+²); and intensification of soya and livestock production, resulting in more being produced from a smaller land area. Additionally, the amount of protected land increased as it became easier for local people to secure land titles.

As a result of such changes the authors are cautiously optimistic that future expansion in tropical oil crops can occur without destroying forests and usurping local land rights. They also identify places where smallholders are able to contribute to the increase in production. However, new struggles with respect to land use associated with increases in tropical oil crops are also suggested, as with oil palm

² 'reduce emissions from deforestation and forest degradation', which offers payments for actions to reduce forest carbon emissions.

production in Africa and Myanmar, and soybean production in Paraguay.

As mentioned earlier, the book does not focus on the biological and agronomic aspects of oil palm and soybean production. The authors suggest that unlike many other crops, large yield gaps among producers do not exist with tropical oil seeds. Oil palm – a perennial crop, with trees having an economic life of about 25 years – is, however, a challenge to genetic improvement because of the long timescales involved. Nevertheless, even in this case, considerable increases in yield have already been achieved by the replacement of the *dura* type crop with higher yielding *tenera*.

The book ends on a relatively optimistic note. The authors' analyses suggest that growth in demand will slow sharply by 2050, due to reduced growth in the demand for tropical oils as biofuels and ingredients in food and, as the growth in meat consumption in China levels off, for protein meal from soybean. They suggest that while issues of land use change have not been completely resolved, the slower growth will make management of the negative aspects easier, facilitated by improved methods for monitoring land use. They view the slow-down in deforestation in Brazil as a positive sign, and note that Indonesia is attempting to follow the same path. Development of oil crop production in other areas, however, may cause new threats to livelihoods and land ownership. For example, the authors suggest that Africa has the potential to move centre stage in the oil crop revolution, and view the rainforests of the Congo basin as being particularly threatened if this occurs. There are of course, large uncertainties about future consumption trends. The authors identify particularly

the critical role that consumers in China (the world's largest importer of soybean, mostly from Brazil) and consumers in India (the world's largest importer of vegetable oil, mostly from Indonesia) are likely to have on future demand. Not everyone will be convinced that growth in demand will decrease, but the arguments advanced in the book are well crafted.

This book is immensely valuable in opening up to scrutiny the complexity of the issues involved in tropical oil crop production and in highlighting the geographic, political and historical factors that vary so significantly among the producer countries. It also makes a wealth of relevant statistical information easily available. I strongly recommend it to tropical oilseed specialists and non-specialists alike, and will most certainly be using it as a resource in my own teaching.